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SECTION VII.—WEATHER AND DATA FOR THE MONTH.

WEATHER OF NOVEMBER, 1917.

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PRESSURE AND WINDS.

The distribution of the mean atmospheric pressure over the United States and Canada, and the prevailing direction of the winds for November, 1917, are graphically shown on Chart VII, while the means at the several stations, with the departures from the normal, are shown in Tables I and III.

At the beginning of the month the pressure was relatively high throughout the United States, but in the Canadian Northwest it was slightly below the seasonal average. High pressure continued in most sections throughout the first decade, except for a few days about the middle of the period, when it was relatively low in the western half of the country. During the second decade, except for the occasional passage of a low area across the country, the pressure was likewise generally above the average. At the beginning of the third decade lower pressure prevailed over the eastern half of the country, but in a few days there was a return to higher readings, which continued until near the end of the month, when lower pressure overspread most sections of the country. The month closed with relatively low pressure throughout central districts and in the far Northwest; elsewhere it was near the normal.

For the month as whole, the barometric pressure averaged above the normal in all districts except in the New England States and the Canadian Provinces to the northeastward, where it was below the seasonal average. The departures were generally not large, although in the upper Lakes Region and portions of the Rocky Mountains they were rather pronounced.

The distribution of the HIGHS and LOWS resulted in prevailing northerly winds in the Atlantic and eastern Gulf States and portions of the upper Lakes Region, while southerly winds were frequent in much of the great central valleys. Elsewhere variable winds prevailed.

TEMPERATURE.

The month opened with temperature below the normal in all districts, except parts of the Northwest and the far West. About the middle of the first decade there was a general warming up and mild weather was the prevailing condition throughout most of the country until the middle of the month. During the next few days frost occurred in the interior of California, and it was cool in the Cotton Belt and Middle Atlantic States, and some frost occurred in the South Atlantic and eastern Gulf States. During the last decade of the month it was colder than the seasonal average in the lower Lakes Region and the North and Middle Atlantic States and about normal in the Cotton States, while elsewhere it was warmer than normal, especially in the middle and upper Missouri Valley, where it averaged about 15 degrees above the seasonal temperature.

The month as a whole was warmer than normal in most central and western districts, and cooler than the

seasonal average from the lower Lakes Region, and the lower Ohio and lower Mississippi Valleys eastward. Over most of the Missouri Valley and central and northern Great Plains, the temperature for the month averaged from 6 to 15 degrees above the normal, while in some of the Canadian Provinces to the northward the positive departures were 20 degrees or more. In North Dakota and portions of the adjoining States it was the warmest November in 25 years, and November was warmer than October. The temperature averaged over 3 degrees a day below the normal in Florida, the extreme eastern Lakes Region, and along the immediate Atlantic coast.

PRECIPITATION.

During the first and second decades there was much sunshine and very little precipitation, except about the middle of the first decade, when rain fell in the Pacific States and Nevada; and during the latter part of the second decade widespread, but moderate, rain fell from the Central Plains southward and throughout the Cotton Belt. The first few days of the third decade were marked by considerable rain or snow in the Lakes Region and Northeastern States. This was followed by generally fair weather in most sections until near the end of the month, when moderate precipitation fell in the far Northwest and from the Plains Region eastward.

The precipitation for November, as a whole, was unusually light, the month being among the driest Novembers ever known in many districts. From northern Oklahoma and central Missouri northward there was decidedly little rain or snow, except in small areas. Most of the Rocky Mountain and Plateau States had less than half an inch, while in practically the whole of Arizona and portions of the adjoining States no precipitation occurred during the entire month. In the Pacific States the amounts were generally below the normal, although from 6 to 8 inches occurred in the extreme western portions of Washington and Oregon, as well as in northwestern California.

Snowfall.

During November the snowfall was unusually light, although moderate amounts fell at points in the upper Lakes Region and to the eastward. In the districts from the Rocky Mountains westward but little snow appears to have fallen, even in the high mountains.

RELATIVE HUMIDITY.

The relative humidity was above the average in the northern part of the country, except in portions of the upper Missouri Valley, where it was generally below. Elsewhere the atmosphere in most sections was relatively drier than the normal, especially from the eastern Gulf States westward to the Rocky Mountains.

GENERAL SUMMARY.

November's weather was generally favorable for outdoor occupations in practically all sections of the country and all Fall work progressed in a satisfactory manner,

except where delayed by the scarcity of labor. The rainfall was much below the normal in practically all the winter-wheat-growing area and the dry weather delayed the germination of late sown grain and in some sections prevented plowing and seeding, but conditions were favorable for drying corn. The hardy winter truck crops were generally in good condition. The dry weather was unfavorable for pastures and ranges, particularly in the Southwest, and stock was in poor condition. The weather was favorable for the citrus and raisin crops, but strawberries in Florida needed rain.

Average accumulated departures for November, 1917.

Districts.	Temperature.			Precipitation.			Cloudiness.		Relative humidity.	
	General mean for the current month.			General mean for the current month.			General mean for the current month.		General mean for the current month.	
	° F.	° F.	° F.	Inch.	Inch.	Inch.	0-10	P. ct.	P. ct.	P. ct.
New England.....	36.7	-3.4	-17.0	0.85	-2.80	-3.10	4.5	-1.6	70	-6
Middle Atlantic.....	41.7	-2.5	-13.4	0.67	-2.20	-3.50	4.4	-1.9	69	-5
South Atlantic.....	51.6	-2.5	-2.4	0.70	-1.90	-10.80	3.2	-1.2	72	-4
Florida Peninsula....	66.7	-3.9	-1.1	0.24	-2.00	-10.10	3.6	-0.6	70	-10
East Gulf.....	53.9	-1.8	-3.2	1.36	-2.10	-6.10	3.0	-1.5	65	-10
West Gulf.....	57.8	+1.4	+1.9	1.87	-1.30	-13.10	3.1	-1.6	66	-7
Ohio Valley and Tennessee.....	44.0	-0.6	-19.4	0.78	-0.30	+2.20	5.1	-0.5	73	0
Lower Lakes.....	36.1	-3.0	-29.8	1.00	-2.00	+0.30	6.0	-1.3	80	+4
Upper Lakes.....	38.1	+1.8	-30.7	0.82	-1.60	-2.90	6.1	-1.0	82	+2
North Dakota.....	37.8	+13.3	-7.6	0.14	-0.60	-9.20	4.7	-0.8	80	+1
Upper Mississippi Valley.....	42.2	+4.4	-23.7	0.25	-1.60	-3.50	5.8	+0.3	76	+2
Missouri Valley.....	44.8	+7.3	-7.6	0.19	-0.90	-5.50	4.7	-0.2	70	0
Northern slope.....	40.7	+8.7	-10.2	0.42	-0.40	-1.80	4.4	-0.7	69	0
Middle slope.....	48.0	+6.2	-2.9	0.25	-0.70	-7.10	3.7	-0.3	58	-5
Southern slope.....	53.3	+4.8	+8.7	0.27	-0.90	-8.10	2.9	-1.5	51	-15
Southern Plateau.....	52.9	+4.4	-1.0	0.08	-0.60	-2.70	1.4	-1.4	45	-3
Middle Plateau.....	42.8	+3.2	-21.4	0.51	-0.40	-2.70	4.2	-0.1	55	-6
Northern Plateau.....	43.4	+4.8	-7.8	1.00	-0.40	-2.30	6.1	0.0	68	-3
North Pacific.....	49.9	+4.4	-3.2	4.43	-2.40	-11.00	6.7	-0.9	96	0
Middle Pacific.....	55.3	+2.2	+0.7	1.78	-1.40	-9.40	4.8	+0.1	72	-3
South Pacific.....	60.0	+2.5	+1.6	0.32	-1.00	-4.30	3.1	-1.3	66	-1

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WEATHER CONDITIONS OVER THE NORTH ATLANTIC OCEAN DURING NOVEMBER, 1916.

The data presented are for November, 1916, and comparison and study of the same should be in connection with those appearing in the REVIEW for that month.

Chart IX (xlv-111) shows for November, 1916, the averages of pressure, temperature, and the prevailing direction of the wind at 7 a. m. 75th meridian time (Greenwich mean noon), and notes on the locations and courses of the more severe storms of the month are included in the following summary.

PRESSURE.

The distribution of the average pressure for the month, as shown on Chart IX, differed but little from the normal over the greater part of the ocean. The North Atlantic and continental HIGHS were practically normal in position, extent, and intensity, but the Icelandic Low, with a mean pressure of 29.48 inches, was considerably south of its usual position.

The pressure changes from day to day were unusually large in some localities; the greatest range occurred in the square between latitudes 50°-55° N. and longitudes 20°-25° W., where the lowest barometer reading was

28.22 inches on the 16th, and the highest, 30.40 inches, on the 27th.

The following table gives for a number of selected 5-degree squares the average pressure for each of the three decades of the month, as well as the highest and lowest individual readings reported during the month within the respective squares.

Pressure over the North Atlantic during November, 1916, by 5-degree squares.

Position of 5-degree square.		Decade means.			Extremes.			
					Highest.		Lowest.	
		I.	II.	III.	Pressure.	Date.	Pressure.	Date.
Latitude.	Longitude.	Inches.	Inches.	Inches.	Inches.	Nov.	Inches.	Nov.
40-45 N	20-25 W	29.41	29.50	29.63	30.18	13	28.81	27
40-45 N	0-5 E	29.29	29.93	29.45	30.42	14	28.70	6
55-60 N	35-40 W	29.58	29.35	29.71	30.20	27	28.79	17
55-60 N	5-10 W	29.13	29.74	29.58	30.30	14	28.78	4, 7
55-60 N	0-5 E	29.35	29.94	29.66	30.42	14, 15	28.90	8
50-55 N	55-60 W	29.87	29.67	29.82	30.30	29, 30	29.26	10
50-55 N	45-50 W	29.67	29.49	29.78	30.26	27	29.18	17
50-55 N	20-25 W	29.45	29.42	29.56	30.40	27	28.22	16
50-55 N	0-5 W	29.39	29.78	29.94	30.38	16	28.70	16
50-55 N	5-10 E	29.62	29.90	29.95	30.43	15	28.80	19
45-50 N	65-70 W	30.08	30.03	29.95	30.54	7	28.92	24
45-50 N	50-55 W	29.84	29.65	29.94	30.46	27	29.40	10, 21
45-50 N	5-10 W	29.57	29.76	30.10	30.46	28	28.86	18
40-45 N	45-50 W	29.78	29.84	30.14	30.51	28	29.10	8
40-45 N	10-15 W	29.84	29.85	30.26	30.50	28	29.10	4
35-40 N	40-45 W	30.01	30.05	30.13	30.53	25	29.35	9
30-35 N	65-70 W	30.14	30.12	30.20	30.42	27	29.92	3
25-30 N	95-100 W	30.08	30.22	30.13	30.60	15	29.90	8
15-20 N	85-90 W	29.87	29.91	29.97	30.06	26	29.76	13

The mean and extreme values presented in the above table are based on the daily pressure values determined by interpolation for each square in the daily synoptic charts of the North Atlantic Ocean compiled by the Marine Section of the Weather Bureau.

GALES.

The number of gales and their relation to the normal differed considerably in the several portions of the ocean, as north of the 50th parallel and in the waters adjacent to the greater part of the American coast they were reported on comparatively few days, while over a large territory in mid-ocean they were considerably more numerous than usual. The greatest number occurred on the 5-degree square between latitude 45° to 50° and longitude 35° to 40°, where they were reported on 13 days, a percentage of 43, while the normal percentage for that square is 18.

On November 1 and 2 there was a Low of moderate intensity between the 40th meridian and the American coast, that was attended by moderate gales over a limited area.

On the 2d the southern limits of a second depression extended to a point near latitude 53°, longitude 20°. By the 3d this had developed in a marked degree, the center now being near Blacksod Point, on the west coast of Ireland, where the barometer reading was 28.53 inches. No specially heavy winds were reported from any of the few vessels in the vicinity, as the highest velocity recorded was 40 miles an hour.

On the 4th this disturbance was central near latitude 48°, longitude 13° W., the pressure having changed but little since the previous day, while the storm area had increased slightly in extent. This Low recurved toward the north and on the 5th the center was near Holyhead, England, the lowest barometer reading being 28.58 inches, with northwest gales of from 40 to 65 miles an hour over

the region between the 20th meridian and the European coast, and the 45th and 55th parallels.

On the 5th a second LOW, *I* on Chart IX, was central about 10° east of St. Johns, N. F., several vessels in the southerly quadrants having encountered moderate westerly gales.

The European LOW continued in its northerly course, and on the 6th surrounded the Shetland Islands, the wind velocities evidently having moderated since the previous day, although few vessel reports were received from the vicinity.

LOW *I* moved rapidly in a due easterly direction, and on the 6th the center was near latitude 47°, longitude 27°, and winds of gale force prevailed between the 20th and 45th meridians. This disturbance curved sharply toward the northeast, and on the 7th was in the vicinity of the north coast of Scotland. Reports of gales were received from a number of vessels scattered over a large territory between the 58th meridian and the European coast, extending as far south as the 45th parallel. LOW *I* moved slowly toward the northeast during the next 24 hours, as shown on Chart IX, and on the 8th conditions of wind and weather were practically the same as on the previous day, although the storm area had diminished in extent, and hail was reported by one vessel.

On the 8th a second well-developed LOW was central near latitude 44°, longitude 44°; the barometer reading was 28.85 inches and moderate to strong gales prevailed between the 33d and 60th meridians.

On the same day one vessel reported a northeasterly gale of 60 miles an hour off the southern coast of Cuba, although there was only a slight depression with a minimum reading of 29.77 inches near latitude 15°, longitude 78°. On the 9th neither LOW *I* nor the West Indies disturbance appeared on the chart, while the second LOW of the 8th was central near latitude 48°, longitude 38°, and winds of gale force prevailed over a large area, between the 30th and 52d parallels, and the 25th and 55th meridians. On the 10th this disturbance began to fill in, and the storm area had contracted in extent, although a number of vessels as far south as the Azores still encountered moderate gales.

On the 12th a LOW, *II* on Chart IX, covered the greater part of the region between Jamaica and Central America. This depression was present in the waters during nearly all the previous portion of the month, although it was of slight intensity, and accompanied by light to moderate winds. On the 12th, however, it increased in force, as the barometer fell to 29.66 inches, although there was no material increase in wind velocity. On the same day a second disturbance was central near latitude 48°, longitude 42°, and moderate gales accompanied by hail prevailed over a limited area in the southern quadrants. LOW *II* moved slowly toward the northwest, and on the 13th its center was near Swan Island; the lowest barometric reading was now 29.60 inches, but there was little change in the conditions of wind and weather since the 12th. The northern LOW moved about 6° due east during the next 24 hours, and while the barometer had risen slightly, the storm area was somewhat larger on the 13th than on the previous day, moderate gales with hail and snow still prevailing. LOW *II* continued on its slow northwesterly course, with little change in intensity. The northern LOW remained practically stationary in position and lost in force, although on the 14th a number of reports were received from vessels between the 37th and 57th parallels, indicating winds of gale force, with hail and snow. LOW *II* curved sharply toward the north, and on the 15th the center was near the west end of Cuba, with increased in-

tensity, and northerly gales of 60 miles an hour were encountered in the Gulf of Mexico. The northern disturbance remained in nearly the same position as on the two previous days, strong gales with hail still raging over a large territory. The center of LOW *II* did not appear on the chart after the 15th, although on the 16th moderate gales occurred in the eastern part of the Gulf of Mexico and off the eastern coast of Florida, attended by barometric readings of from 30 to 30.3 inches. The northern LOW moved rapidly toward the east, and on the 16th was central near latitude 55°, longitude 23°; with increased intensity, the minimum barometer reading being only 28.20 inches, the lowest recorded during the month. Gales of from 40 to 70 miles an hour swept over the territory between the 45th and 60th parallels, and the 15th and 35th meridians, hail also being reported by a number of vessels. The LOW moved rapidly toward the north and on the 17th the center with a minimum of less than 28.80 inches was apparently somewhere between Iceland and Greenland, although the center could not be plotted on account of lack of observations. On the same day a high with a crest of 30.24 inches was central near Boston, and while the centers of these areas were a long distance apart, strong gales with hail and snow prevailed over that part of the intermediate territory between the 40th and 50th parallels and the 35th and 55th meridians. From the 18th to the 21st a LOW covered the waters adjacent to the European coast, between the 45th and 60th parallels, but no heavy winds were reported in the immediate vicinity.

On the 18th a HIGH with a crest of 30.33 inches was central about 300 miles southwest of the Azores, while the LOW on that day was in the vicinity of northern France, the minimum reading being 28.64 inches. The steep gradient between these two areas was responsible for the northwesterly gales that prevailed over the central portion of the southern steamer lanes, where snow and hail were also reported. On the 21st and 22nd there was a LOW of slight intensity near latitude 50°, and longitude 37°, and on the former date a few vessels in the southwest quadrants reported moderate gales.

On the 24th a well-developed LOW with a minimum reading of 28.88 inches covered a large part of the Province of Quebec, strong southerly and southwesterly gales prevailing as far south as the 35th parallel, between the 60th and 70th meridians, while only moderate winds were recorded in the immediate vicinity of the American coast. This LOW evidently moved rapidly toward the north, although it was impossible to plot its center on the 25th, on account of lack of observations. Moderate gales were still encountered by a number of vessels along the American coast, between the 34th and 43d parallels, interspersed by reports of winds of not over 35 miles an hour.

The conditions during the remainder of the month were comparatively featureless, as no LOWS of marked intensity appeared during that period, although on the 30th a few vessels near the 50th parallel and 40th meridian recorded northwesterly gales of from 40 to 60 miles an hour, attended by hail and snow.

TEMPERATURE.

The average monthly temperature of the air over the ocean adjacent to the American coast, and in the northern part of the Gulf of Mexico ranged from 2 to 7 degrees above the normal, while along the European coast they were from 2 to 4 degrees above. The departures were also slightly positive in a narrow belt that extended across the ocean between the 35th and 40th parallels, while

over a large portion of the waters north and south of that area the temperatures were either normal or slightly below, the same condition holding true in the southern division of the Gulf of Mexico.

The following table gives the departures for the month at a number of Canadian and U. S. Weather Bureau Stations on the Atlantic and Gulf coasts.

	°F.		°F.
St. Johns, N. F.....	-2.6	Norfolk, Va.....	+1.2
Sydney, C. B. I.....	-1.1	Hatteras, N. C.....	+0.7
Halifax, N. S.....	-0.9	Charleston, S. C.....	+1.1
Eastport, Me.....	-2.6	Key West, Fla.....	-0.1
Portland, Me.....	-1.0	Tampa, Fla.....	+1.4
Boston, Mass.....	+1.4	Mobile, Ala.....	+2.5
Nantucket, Mass.....	-0.7	New Orleans, La.....	+2.0
Block Island, R. I.....	-0.3	Galveston, Tex.....	0.0
New York, N. Y.....	+0.8	Corpus Christi, Tex.....	-0.3

The lowest temperature recorded during the month was 27°, and occurred on a number of different days over the waters adjacent to the east coast of Newfoundland, while the highest reading for the same region was 46°. The seasonal fall in temperature was quite marked, especially in the higher latitudes, where the average for the last decade of the month was considerably lower than usual.

FOG.

The number of days on which fog occurred was much below the normal over the entire ocean. It was reported on 3 days, a percentage of 10, off the banks of Newfoundland where the normal percentage is from 30 to 35. In no other square was it observed on more than one day, and nearly all of the steamer lanes were entirely free.

PRECIPITATION.

The number of days on which hail was observed was apparently larger than usual, and in the square between latitude 45°-50°, longitude 40°-45°, where the maximum amount occurred, it was reported on every day from November 12th to 15th, inclusive, and again on the 17th and 23d. In the regions immediately north, east and west of this square, it was recorded on from 2 to 3 days, while east of the 30th meridian there was none.

Snow was reported on three days in the following squares: Between latitude 40°-45° and longitude 60°-65°; latitude 50°-55° and longitude 35°-40°, and also in the territory between latitude 40°-45° and longitude 40° and 50°. None was recorded in the vicinity of the European coast, or over the eastern section of the steamer routes.

Winds of 50 miles per hour (22.4 m./sec.) or over during November, 1917.

Station.	Date.	Velocity.	Direction.	Station.	Date.	Velocity.	Direction.
		<i>Mis./hr.</i>				<i>Mis./hr.</i>	
Block Island, R. I.	26	50	nw.	New York, N. Y.	18	56	nw.
Buffalo, N. Y.....	3	52	w.	North Head, Wash.	2	50	se.
Ellendale, N. Dak.	21	54	nw.	Do.....	4	53	se.
Escanaba, Mich.....	22	52	ne.	Do.....	27	52	s.
Kansas City, Mo.....	21	66	n.	Pierre, S. Dak.....	21	60	nw.
Lincoln, Nebr.....	21	40	nw.	St. Joseph, Mo.....	21	54	nw.
Mount Tamalpais, Cal.....	5	58	nw.	St. Paul, Minn.....	21	51	nw.
Do.....	28	52	nw.	Sioux City, Iowa.....	21	50	nw.
New York, N. Y.....	6	52	nw.	Tatoosh Island, Wash.....	20	58	s.